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## **Context-sensitive Content Provision for Classified Directories**

Hess, T ; Linnhoff-Popien, C ; Wirth, Werner ; Rauscher, B ; Hirnle, C ; Hochstatter, I ; Buchholz, T ; Karnowski, V ; von Pape, T

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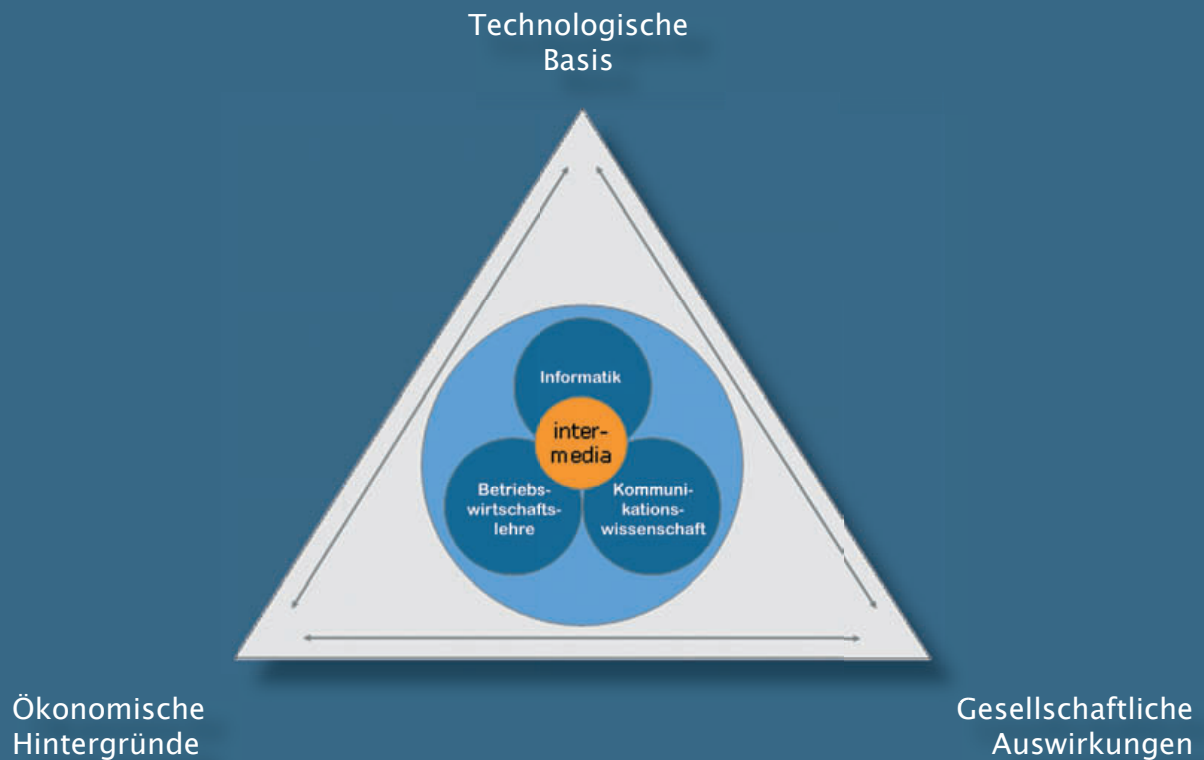
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Thomas Hess (Hg.)

# Ubiquität, Interaktivität, Konvergenz und die Medienbranche

Ergebnisse des interdisziplinären  
Forschungsprojektes intermedia



Universitätsverlag Göttingen

inter  media



Thomas Hess (Hg.)

Ubiquität, Interaktivität, Konvergenz und die Medienbranche

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## Vorwort

Ubiquität und Personalisierung, Interaktivität sowie Konvergenz stellen die Medienindustrie zu Beginn des 21. Jahrhunderts vor beachtliche Herausforderungen. Insbesondere Verlage, Fernsehsender und andere Intermediäre der Medienbranche werden infolge des weiterentwickelten Internets mit tief technologisch getriebenen Veränderungen konfrontiert, die über die Unternehmen das gesamte Mediensystem verändern werden. Das Ziel des interdisziplinären Forschungsprojektes *intermedia* an der Ludwig-Maximilians-Universität München war es, diese sich abzeichnenden veränderten Rahmenbedingungen zu verstehen und zu gestalten. Während der Projektlaufzeit von 2003 bis 2007 wurde der technologiebetriebene Wandel in der Medienbranche mit zehn Teilprojekten aus den Perspektiven Betriebswirtschaft, Informatik und Kommunikationswissenschaft analysiert. Diese interdisziplinäre Forschung wurde anhand additiver (d.h. disziplinärer) und integrierter (d.h. disziplinübergreifender) Forschungsprojekte durchgeführt. Das vorliegende Buch präsentiert zum Ende des Projektes ausgewählte Forschungsergebnisse aus *intermedia*. Dazu wurde auf publizierte Beiträge zurückgegriffen und diese gezielt ergänzt. Bei der Auswahl wurden insbesondere praxisrelevante Arbeiten berücksichtigt. Je nach Originalveröffentlichung sind diese Beiträge in deutscher oder englischer Sprache verfasst.

Im ersten Teil des Buches gibt Thomas Hess zunächst einen Überblick über die Arbeit und die Struktur von *intermedia*. Anschließend stellen er und Benedikt von Walter das Intermediärskonzept vor, bevor Thomas Hess, Hans-Bernd Brosius, Claudia Linnhoff-Popien und Christoph Grau das aus *intermedia* heraus entwickelte Zentrum für Internetforschung und Medienintegration der LMU München vorstellen.

Die Vorgehensweise additiver Forschungsprojekte ist im zweiten Teil des Buches dargestellt. Dieser Teil behandelt in drei Abschnitten die drei wesentlichen Trends, deren Auswirkungen im Rahmen des Projektes analysiert wurden.



Der erste Abschnitt des zweiten Buchteils befasst sich mit dem Trend der Ubiquität und Personalisierung. Barbara Rauscher, Thomas Thallmayer und Thomas Hess untersuchen aus ökonomischer Sicht den Nutzen der Individualisierung von digitalen Medienprodukten. Aus dem Bereich der Informatik stammt der Artikel von Johannes Martens, Georg Treu und Axel Küpper, der sich mit ortsbezogenen Community-Diensten am Beispiel eines mobilen Empfehlungsdienstes beschäftigt. Anschließend stellen Werner Wirth, Veronika Karnowski und Thilo von Pape aus kommunikationswissenschaftlicher Perspektive ein integratives Modell zur Messung der Aneignung mobiler Kommunikationsdienste vor.

Dem Trend der Interaktivität ist der zweite Abschnitt des zweiten Buchteils gewidmet. Der Abschnitt beginnt mit einem Beitrag von Oliver Quiring, der die sozialen Einflüsse auf die Adoption interaktiver Technologien aufzeigt. Thomas Hess, Arnold Picot und Martin S. Schmid liefern daran anschließend einen Ausblick auf die Zukunft der Branche des interaktiven Fernsehens und die Rolle der Intermediäre aus ökonomischer Sicht. Aus der Perspektive der Informatik stellen Richard Atterer, Albrecht Schmidt und Heinrich Hußmann die Entwicklung von Werkzeugen zur Verbesserung der Benutzerfreundlichkeit von Web-Anwendungen vor.

Der dritte Abschnitt im zweiten Buchteil, ebenfalls noch zu additiven Projekten, beschäftigt sich mit Konvergenz. Zu Beginn zeigt Axel Küpper aus Sicht der Informatik Konvergenz-Szenarien in der Mobil-Kommunikation auf. Arnold Picot, Martin S. Schmid und Matthias Kempf ergänzen dieses Themenfeld um ökonomische Gesichtspunkte. Sie untersuchen die Veränderung der Organisation der Wertschöpfung in der Medienbranche unter dem Einfluss der Digitalisierung und des Internets. Die Perspektive der Kommunikationswissenschaft legen Thilo von Pape und Thorsten Quandt dar, indem sie eine Multimethoden-Studie zur Aneignung neuer Medientechnologien vorstellen.

Integrierten Forschungsvorhaben in intermedia ist der dritte Teil des Buches gewidmet. Oliver Quiring, Benedikt von Walter und Richard Atterer analysieren das Nutzerverhalten in Musiktäuschkörsen unter verschiedenen ökonomischen Anreizbedingungen. Abschließend untersuchen Thomas Hess et al. die kontext-sensitive Inhaltebereitstellung für Branchenverzeichnisse.

Ich danke den Autoren für die Beiträge zu diesem Sammelband, den Inhabern der Rechte an den Originalbeiträgen für ihr Mitwirken sowie Elisabeth Höhne, Florian Sixt und Julia Gebele für die Endredaktion dieses Buches. Ebenfalls gilt mein Dank dem Bundesministerium für Bildung und Forschung, in dessen Schwerpunktprogramm „Internetökonomie“ das Projekt intermedia gefördert wurde, sowie beim Projektträger DLR. Zudem danke ich Dr. Birgit Schmidt vom Universitätsverlag Göttingen für die professionelle Zusammenarbeit und die Veröffentlichung des Sammelbandes als innovative Open-Access-Publikation.

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# Context-sensitive Content Provision for Classified Directories\*

*Thomas Hess / Claudia Linnhoff-Popien / Werner Wirth / Barbara Rauscher / Christoph Hirnle / Thomas Buchholz / Iris Hochstatter / Veronika Karnowski / Thilo von Pape*

## 1 Objective and structure of the overall project

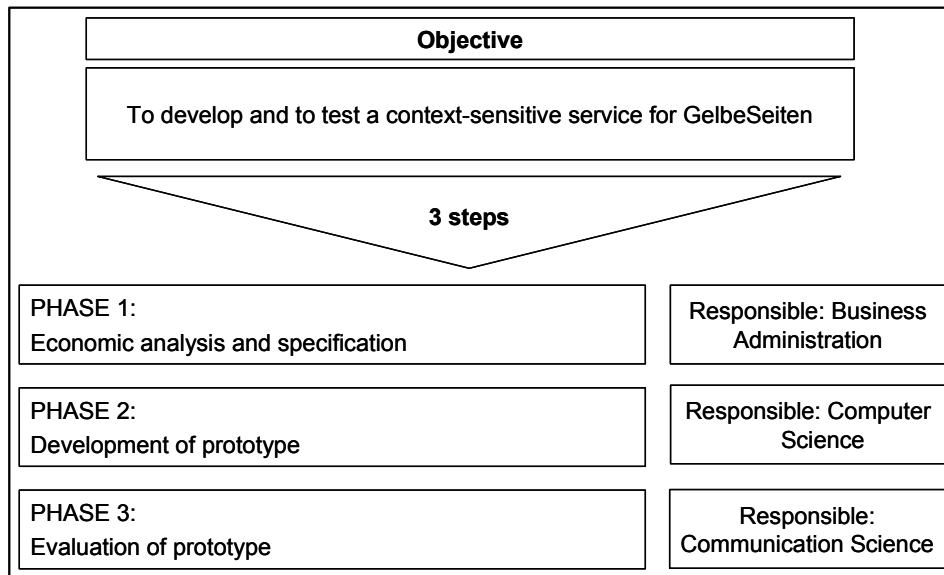
The mobile communication innovations of the last decades have, amongst other technological novelties, substantially changed society: it has become more flexible and faster paced. While mobile telephony has arrived at a certain saturation point, the now mobile society demands other services to be mobile, too. Context-sensitive service provision is one way of providing additional mobile services in a manner which takes advantage of location information.

As a test case for context-sensitive service provision, the overall goal of this research project was to develop and to test a context-sensitive service for GelbeSeiten, a cooperation of regional German classified directories companies. In short, three phases were gone through. First, based on economic considerations, a specification of the context-sensitive service was put up. Parts of this specification were then implemented in a second step. In the final evaluation phase, a field experiment yielded insights both for the economic evaluation of the business model

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\*An earlier version of this chapter was published in: Kern, E.-M. / Hegering, H.-G. / Brügge, B. (Hrsg.): Managing Development and Application of Digital Technologies, Berlin (Springer), S. 325–336. Copyright: Springer Verlag (Used with permission from Springer Verlag)

“context-sensitive services for classified directories” and on adaptation processes from a communication science point of view (see figure 1).



**Figure 1. Objective and project structure**

Four institutions were involved in the conceptual design, its realization and the empirical studies: GelbeSeiten Marketing Services, Keller Verlag Munich, its IT-subsidiary IT2Media and the University of Munich (LMU). From the academic side, within the research project intermedia, three disciplines were involved: business administration, computer science and communication science. Every phase was lead managed by one of the three fields.

## **2 Phase 1: economic analysis and specification**

The first phase of the project was concerned with the economic analysis and the specification of the context-sensitive service.

A context-sensitive service is a service that is able to adapt to the context and thus to the situation of the user. The term context is defined as every piece of information about an entity that is relevant for the interaction of user and application (Dey 2001). The special benefit to users of context-sensitive services lies in the automatic adaptation of services to the current situation and the preferences of the user. This facilitates personalization of content which in turn is extremely helpful when considering the limited display possibilities and time restrictions of mobile communication equipment and mobile applications.

For these reasons, the classified directories editor GelbeSeiten considered the usage of new positioning technologies as highly relevant. In a first step, different business models based on the technology of context-sensitive services were developed for GelbeSeiten. Later on, these business models were evaluated making use

of market-based and resource-based views (see Porter 1999; Barney 1991). The context-sensitive service solution for classified directories appeared to be of advantage from both perspectives.

## 2.1 A market-based view

The market-based view on the business models was to examine which competitive forces GelbeSeiten is facing and how strong these forces are. At the time of analysis, YelloMap and KlickTel were identified as the dominant competitors. This result indicates that direct competition on the market is quite low. Thus, it is rather simple to evaluate the relative strengths of the competitors. Due to this constellation, measures enhancing rivalry will not stay undetected and are therefore rather unlikely. The sector for mobile classified directories is quite young and still grows slowly. It is obvious that in such a small and slowly increasing market players are struggling to win more market shares for themselves. However, because of the expected growth, competitors can grow organically with the market which again reduces rivalry. High exit barriers can also increase competition as even non profitable firms would rather stay than retreat. Nevertheless, as the supply of mobile classified directories requires no specific assets and no high fixed costs are to be worried about, exit barriers can be considered to be quite low. In addition, these low barriers for resigning stabilize the profits in a sector and competition decreases.

Rivalry could increase by new market entrants because of growing capacities and therefore falling prices. A market sector is protected by certain entry barriers which have to be overcome by new competitors. Nevertheless, GelbeSeiten faces low barriers if it wants to enter the market for mobile classified directories. It can realize high economies of scope as many functions and operations already exist and will not have to be set up; examples include the database, a sales force and a large customer base. Furthermore, GelbeSeiten owns an attractive brand name. That way, it is cheaper for GelbeSeiten to enter the market than it would be for other competitors who would have to set up material and immaterial assets. Experience and size of GelbeSeiten are factors that should not be neglected and can also cause cost advantages. Entering a new market in an early stage minimizes the risk to have to compensate switching costs of competitors' customers.

The threat from substitutes is another competitive force that GelbeSeiten has to face. Substitutes lower potential profits. They level the upper price limit for a service in case they offer functions similar to a mobile classified directory. In the case of classified directories such services have the potential to cannibalize the branch if they replace advertisements or match supply and demand in another way. For instance, search engines, online catalogues or Ebay-like services can all be used via mobile phones using WAP technology.

Customers are also putting strain on the attractiveness of a sector. They demand better service or lower prices and have the power to play some competitors

off against the others. This is especially dangerous if customers are concentrated and responsible for the major part of revenues of a provider. In the case of GelbeSeiten this threat is limited as customers as well as advertisers are widely dispersed. Hence, almost no bargaining powers can be bundled. Additionally, costs for advertisers can be kept low and, therefore, lower price sensitivity can be assumed.

The last competitive force is the bargaining power of suppliers. They can increase prices or decrease quality. Concerning mobile classified directories, the most important suppliers are mobile network operators and DeTeMedien. As DeTeMedien is invested in GelbeSeiten, they will not use their bargaining power as forcefully as they could. On the other hand mobile network operators are a concentrated group of suppliers whose service can not be substituted. It is possible that they threat forward integration and thus limit the bargaining power of GelbeSeiten. Figure 2 sums up the results of the market-orientated analysis. As a conclusion, GelbeSeiten can in essence use their existing strong brand name in the field of classified directories without facing too fierce a competition.

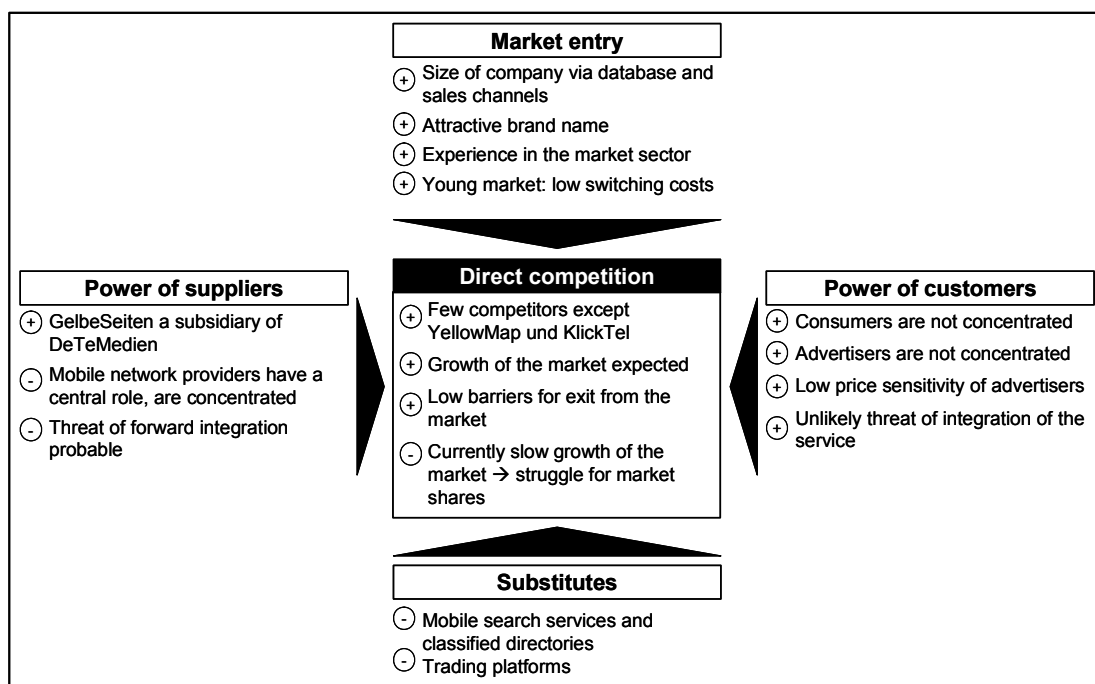


Figure 2. Results of the market-based view analysis

## 2.2 A resource-based view

From this point of view, existing information about the sector can be used to extend sales channels by additional mobile ones. A high quality database and its updating are the basic resources for a mobile online classified directory. For customers, this resource is of critical value and, therefore, has value-creating effects

for GelbeSeiten. Such a database is exclusively kept by GelbeSeiten. This underlines the immense worth of this resource. The complexity of the data stock and the complexity of its further development can easily prevent imitations and protect the value of the resource. The database has a high strategic value for GelbeSeiten because it is asymmetrically distributed in favor of GelbeSeiten.

Another important competency is the processing of data through value added services, like e.g. geo-coding or updates of data. While the current database of GelbeSeiten is already geo-coded, the necessary routines for updating entries by the advertisers themselves are not yet implemented. Such a function would be rare on the market and would generate additional value for customers and advertisers. GelbeSeiten could skim it. In case GelbeSeiten can close this resource-gap, they could profit from first-mover advantages. Developing this competency can initially bring relative advantages against competitors; further development can permanently save them. Protection from imitation is also built up this way and profits can be acquired effectively.

Analogous to missing functions for updating data stocks, GelbeSeiten has no explicit competencies for the contextual supply of content. Resources are fundamental for this service and have the potential to create first-mover advantages and additional value. Nevertheless, there is a threat of imitation. Altogether, the value of this resource is rather operational than strategic.

Besides these functional resources, GelbeSeiten has a strong brand name which can also be considered as a scarce resource. The awareness and publicity can create trust and additional value for GelbeSeiten. As building up a brand is quite time-consuming, this resource is a lasting advantage and very difficult to imitate or substitute. The brand and brand name have high strategic value and bring along benefits in competition. Figure 3 summarizes this resource-based view analysis.

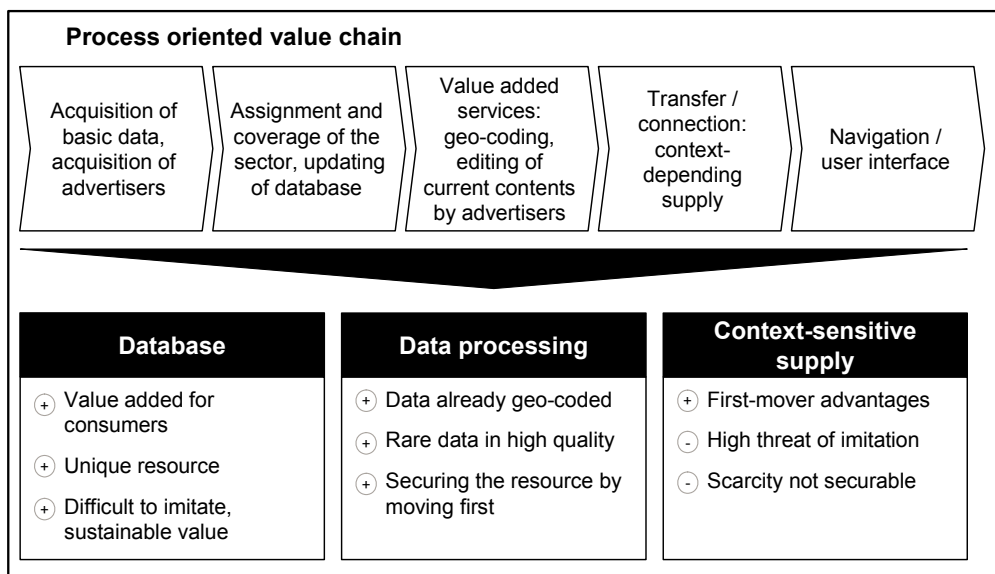


Figure 3. Results of the resource-based view analysis



On the basis of these economic considerations, a concept for a mobile classified directory was developed. It served as a template for the later realization of a prototype in phase 2 and will not be introduced here in further detail.

### 3 Phase 2: development of a prototype

In the second phase of the project, a prototype for a context-sensitive service was developed. To simplify the implementation in the first step, the restaurant sector was chosen as a test case. In effect, a restaurant locating service was implemented (see use case diagram in figure 4).

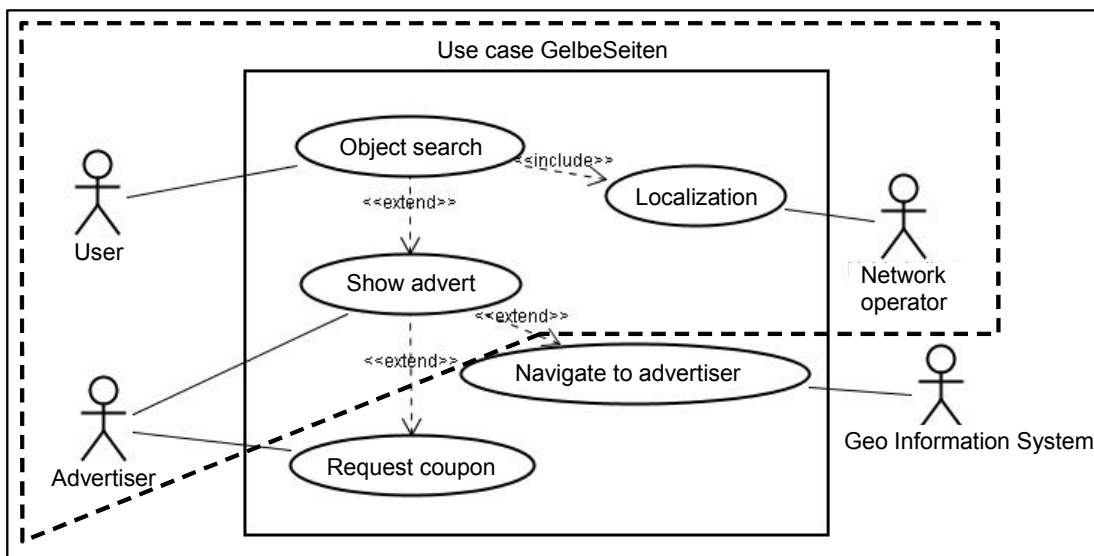


Figure 4. Use case diagram for the RestaurantFinder

In cooperation with IT2Media, a subsidiary of the cooperation partner Keller Verlag, a specification was put up which integrated the existing infrastructure and the databases. This architecture is displayed in figure 5. For using this service, a client for mobile phones was developed based on J2ME. The user can retrieve the service via an easy-to-use interface. The current position of the user of the RestaurantFinder can be determined by a mobile GPS receiver which transfers data to the mobile phone via Bluetooth. This context-information is transferred to the RestaurantFinder when called and then processed. Preferences of users are stored in a profile database which again is linked to the restaurant server. Additional context-information for the second version of the service is provided using CoCo as a middleware (see Buchholz et al. 2004; Hochstatter / Krause 2004). CoCo stands for Context Composition and links functions for context-acquisition, -processing and -distribution. Context-information is provided by context information systems (CIS) as displayed in figure 5.

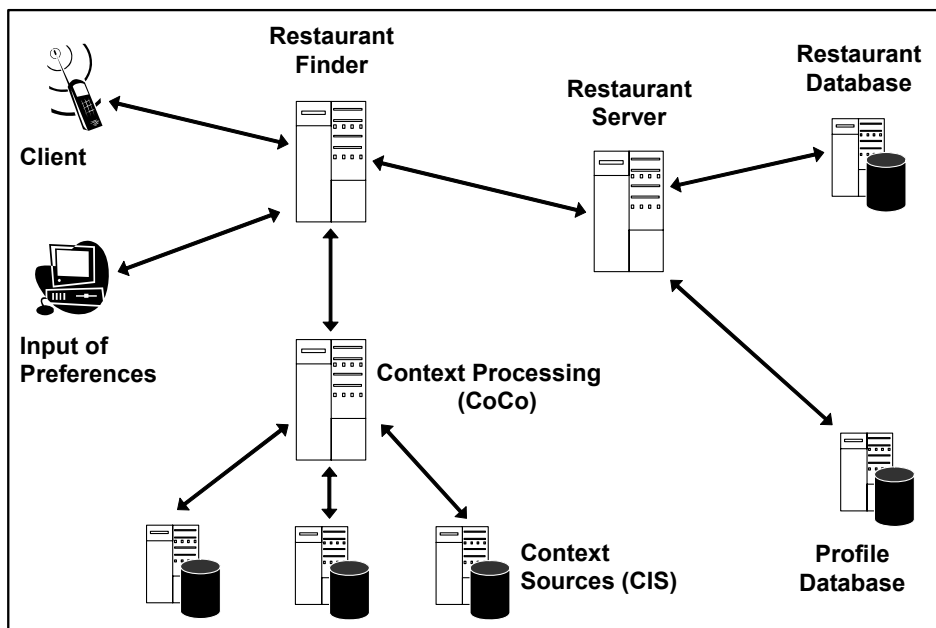


Figure 5. IT Architecture for the RestaurantFinder

The RestaurantFinder service is run on the mobile phone of the user and links itself to the databases of Keller Verlag via the respective servers. In detail, the service was implemented in two different versions. The first one is a location based service where the service is adapted to the position of the user; the second one additionally reacts to context-information retrieved from other sources such as preferences concerning cuisine, payment, seating, type of the restaurant (café, bar, etc.) or information concerning the location like opening hours. Figure 6 provides an overview of the basic functions.

Functions	
Overview	Detailed information
<ul style="list-style-type: none"> <li>• List of suitable restaurants</li> <li>• Name, address of restaurants</li> <li>• Restaurant choice for next steps</li> </ul>	<ul style="list-style-type: none"> <li>• Precise address</li> <li>• Cuisine / nationality</li> <li>• Type of restaurant</li> <li>• Seating</li> <li>• Payment</li> </ul>

Figure 6. Implementation of the RestaurantFinder

## 4 Evaluation of the prototype

### 4.1 Specification of the empirical study

The empirical analysis represents the third and final phase of the joint project. Several findings were gathered at this stage. In all, the studies were to be integrated into the academic research project intermedia and hence had to yield results of scientific significance. The empirical study was on the one hand basis for further interdisciplinary research of the GelbeSeiten project; on the other hand it was meant to answer relevant discipline-specific questions. For example, the functionality of a context-sensitive service had to be supported from a technical point of view.

From a communication science perspective, the study served as an analysis for appropriation of context-sensitive services. As a basic assumption, we presupposed that success or failure of the additional services would decide in the process of appropriation (see Karnowski et al. 2006). Appropriation is regarded as the further integration of the innovation into the daily life of the user after his first decision to adopt.

Appropriation is a highly complex process that results from many psychological and social factors (see Wirth et al. 2007 for details). Basically appropriation can be seen as a two-dimensional process. The first dimension is the negotiation of usage and handling, the second dimension is the negotiation of prestige and social identity (see figure 7). The process of appropriation ends when patterns of usage and handling and the corresponding prestige and social identity have stabilized (see Wirth et al. in this volume).

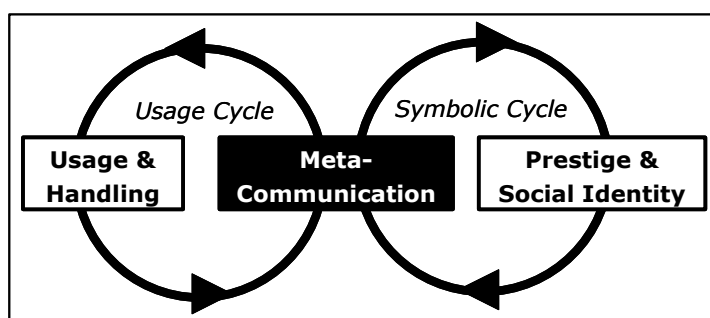


Figure 7. The circular appropriation model (Wirth et al. 2005)

From an economic viewpoint, this phase of the project was used to analyze the value of an actual context-sensitive service. Quantitative as well as qualitative aspects were to be examined. In detail, the research questions besides the technical realization problem concerned the service's economic advantages and the appropriation process:

- How do users integrate the service into their daily life – considering both dimensions of usage and identity?
- How much context-sensitive information should a context-sensitive service provide and to what extent should it be personalized and individualized?

Additionally, the study established practical recommendations for the partner companies in respect to the design of the prototype itself.

The experiment was conducted with 48 participants in three waves. The participants were grouped into two samples: one was equipped with a RestaurantFinder which only used location based information; the other was supplied with a version that also included additional context-information. Participants were allowed to use the service for free for two weeks. To analyze usage depending on the integration of context-information, all relevant usage data was stored on the servers. Additionally, guided interviews with the participants were conducted after the test phase. These interviews mainly dealt with prestige and social identity as well as meta-communication (e.g. communication about the service within the own peer group) and usage (with special focus on context-information).

#### 4.2 Results of the empirical study

Concerning the prestige effect of the service we found that overall it was positively received. This can be traced back to the ‘innovation’ and ‘dynamics’ features of the service. Even though mobile restaurant finders cannot be seen as innovative from an academic perspective these days, users consider it to be brand-new and innovative. The service also refers to a dynamic and active lifestyle, which is on the one hand supported by the mobile extraction of information, and can on the other hand be presented towards other people. This was also confirmed by the fact that a lot of meta-communication was observed. Nevertheless, some user statements indicated that the prestige effect was not stable yet which means that the initial interest in the innovative service can also decrease in later stages.

Concerning the integration of context information, two major findings are worth mentioning. On the one hand, positioning (which was integrated in both versions) was acknowledged to be essential value added. In fact, the structured interviews highlighted that to users the positioning system was a good alternative to traditional recommendation systems. However, concerning the usage of other context information such as preferences regarding to the cuisine offered, no positive effects were noted. First, the log-files showed no differences in information retrieval between the two RestaurantFinder versions. Second, it was pointed out during the interviews that the integration of additional context-information did not leave a positive impression; this was mainly because of the static implementation of the input of preferences via the web-interface. Some users requested a mobile option for input or changes of preferences. Others complained that some restaurants

which do not match the specified preferences are not displayed even if they are near to the current position of the user.

## 5 Conclusion

During the three phases, major findings could be derived from a business angle, a technological point of view and a communication science perspective.

From the business point of view, GelbeSeiten could benefit from a fast market entry as the market for context-sensitive services currently is in a very early stage of development. As a pioneer, GelbeSeiten could achieve high loyalty of its customers. When entering the market, the high quality brand name GelbeSeiten could support the new service. On the other hand, building up new resources would be necessary to hold on to competitive advantages. For example, GelbeSeiten would have to negotiate conditions with mobile network providers concerning sales channels or for the gaining of positioning data – in case positioning would not be realized with GPS. Furthermore, existing data stocks of GelbeSeiten would have to be enriched by context-sensitive data. Costs for construction and enhancements of the technological infrastructure must also be taken into consideration.

From the information technology perspective, RestaurantFinder is a complex system consisting of several prototypes. In addition, the profile based search requires a different kind of data collection and standardized storage as it is currently implemented at Keller Verlag. Also, the independence of the database which would theoretically be very reasonable is not given in practice. Further, two hardware problems remain to be solved. First, the Bluetooth communication between the Bluetooth mouse and the mobile phones was problematic. Second, GPS positioning often was slow and quite imprecise.

Concerning the communication science point of view, the most important finding is that positioning is seen as a value added. The idea of the service is perceived as a good alternative to existing recommendation systems. Nevertheless, personalization should be adjusted to usage and handling in daily life, i.e. the creation of profiles should be configured more dynamically. The average user evaluates the creation of profiles to be critical if it is not highly flexible and hence allows to quickly adapting to situational contexts. As main suggestions for improvement the integration of GPS mice and mobile phone on one device, the integration of maps of surroundings, an expansion of the data basis and the integration of a rating system were put forward.

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